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Mission Characterization for HEEET Design		1 of 3	

APPROVAL SIGNATURES		Date
Author:	Peter Gage	5/19/14
Approvers:		Date
Project Manager	Don Ellerby	5/19/14
TPSM Manager	Raj Venkatapathy	5/19/14

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Background

This set of questions addresses the set of requirements that define the operating environment and structural interfaces for the thermal protection system. The information is requested so that the HEEET project can develop capabilities that are consistent with mission needs. Where the mission designers have not yet selected a specific implementation, we seek information about options being considered and the metrics that will guide definition of the vehicle and its operation. Such characterization of the option space will guide sensitivity analyses by the HEEET team, so that we can provide guidance to mission designers about choices that can improve the robustness and efficiency of the thermal protection system.

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Destination and Entry Environment

- What is the mission destination?
- What is the entry interface state? What range of states is acceptable for mission objectives?
- What is the end state of the entry maneuver (altitude and velocity)? What range of states is acceptable for mission objectives?
- Is complete entry trajectory information available for a range of anticipated ballistic coefficients? If a lifting entry vehicle is under consideration, what lift capabilities are assumed?
- What is the level of uncertainty in current entry trajectory estimates?

Launch and Interplanetary Environments

- What pressure loads are anticipated for launch and ascent?
- What vibration and acoustic loads are anticipated for launch and ascent?
- What inertial loads are anticipated for launch and ascent?
- What humidity and contamination environments are anticipated prior to launch?

- What is the interplanetary trajectory and Con-Ops?
- What thermal environments are expected for the heatshield during interplanetary cruise?
- What MMOD environments are anticipated for the heatshield?

Vehicle Geometry and Payload Accommodation

- What interior volume is required for the payload? What payload packaging information is available?
- What are the exterior dimensions of the entry vehicle?
- What are the payload constraints on peak deceleration? What are the allowable temperature ranges for the payload and/or science instruments?
- Are any heatshield penetrations needed for instruments?
- Are there mission operations (such as communication or power) that may levy requirements on the heatshield?
- Where is the location of the interface between heatshield and backshell?

Structural Material and Attachments

- What materials are being considered for the heatshield structure?
 - How is the payload supported within the aeroshell?
 - How is the heatshield attached to the aeroshell?
 - Is the heatshield to be ejected after entry? If so, what is planned for retention and release?
 - Are any heatshield penetrations required for interface with spacecraft bus?
 - What closeouts are needed for interface with backshell?
 - What ballast location and attachment is anticipated?
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Vehicle and Mass Properties

What are entry aeroshell size, shape, and ballistic coefficient? If specifics are not yet determined, range of possible options requested.

What is the mass allocation for TPS?

What is the current mass growth allowance and mass margin for the mission?

What is the uncertainty in current mass estimation for other entry vehicle subsystems?

What is the nominal CG location and what range is acceptable? How much ballast is anticipated for CG management?

TPS Development Risk Mitigation

In addition to the HEEET material, what other TPS materials are being considered?

What are the primary metrics for TPS down-select?

When will down-select be made?

Is the mission risk posture such that there is a need to understand material capability limits or only that there is capability margin against design conditions?

Will the mission consider limiting design entry conditions to levels for which performance can be verified in ground test facilities?

